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ABNORMAL FLOWER STRUCTURE IN *OXALIS STRICTA* L.

H. F. BERGMAN.

(Plate 122.)

WHILE collecting flowers for class use one day in the autumn of 1915 the attention of the writer was attracted by the peculiar appearance of one or two plants of *Oxalis stricta* L. Curiosity as to the nature of this peculiarity led to a closer examination, which revealed the fact that it was due to the replacement of normal flowers by various abnormal developments and in part to the reduction in size of the leaves, which were also decidedly paler than ordinary leaves.

Henri Hus (1907) has described a variant form of *Oxalis stricta* having green petals and somewhat smaller fruits. This form he named *Oxalis stricta viridiflora*. The petals of this form, in addition to the difference in color, differ in shape, width, distribution of the vascular bundles, as also in the shape of the epidermal cells, in the absence of ridges in the latter, number of stomata, and in the number and kinds of hairs present. Bartlett (1909) also reports the occurrence of *Oxalis stricta viridiflora* which, as in specimens described by Hus, differ from normal flowers of *Oxalis stricta* only in the petal characters.

None of the specimens found by the writer possessed the green petals described by Hus (1907) and Bartlett (1909). The sepals and pistils also were distinctly different from those described by either Hus or Bartlett.

Various degrees of abnormality were found, ranging from an almost normal condition to such wide departures from it that they bore little resemblance to flowers. The sepals of normal flowers are narrow and

linear to oblong in form, measuring about 4×1 mm. (fig. 1). Those of the abnormal flowers were broadly obovate and obcordate at the apex, measuring 3.2×3.0 mm. (fig. 2). In shape and vein-arrangement they closely resemble a leaflet of a foliage leaf (fig. 3). Sepals of this form occurred in all the abnormal flowers regardless of other peculiarities that were exhibited.

The sepals of abnormal flowers are pubescent on the back with appressed hairs as in normal flowers, the hairs being mostly of the unicellular, thick-walled type, as described by Hus ('07:102). They differ from foliage leaves in the amount of pubescence, that on the leaves being rather sparse and confined to the under side. The cells of the sepals of abnormal flowers are less elongated than in normal flowers but never as nearly isodiametric as those of the leaves so that the sepals of the abnormal flowers, while strongly suggesting foliage leaves in outline and arrangement of veins, still retain a closer resemblance to normal sepals in the amount and kind of pubescence and in cell-characters.

The petals were not uniform in shape in all the abnormal specimens. Instead of being obovate to obcuneate and yellow as in normal specimens (fig. 4), most of them were reduced to narrow, linear or oblong, pale yellow or whitish structures. One of the most extreme forms is shown in figure 6. This specimen had petals which were nearly orbicular, about 3 mm., in diameter and with a slender claw of about the same length. Others varied between the linear petals (fig. 5) and the normal shape (fig. 4).

The vein-arrangement and shape of cells in petals of the abnormal specimens were similar to those of normal ones except that the epidermal cells at the tips of the petals did not have the ridges projecting into the cell as is true of the epidermal cells at the tips of normal petals.

The stamens as in normal flowers, were of two lengths, the inner series being the longer. They differed from stamens of normal flowers however, in that in all cases they were separate instead of monadelphous. In some specimens the stamens were apparently normal except for being separate. In others the anthers of the inner series were either poorly developed or entirely wanting. The anthers of the outer series were apparently normal. In one specimen part of the stamens had been transformed into narrow, petaloid structures. No examination of the pollen from any of the specimens was made.

The pistil showed the most varied and peculiar structures. In

normal flowers the pistil is columnar, sharply 5-angled and measuring usually 16–18 mm. in length. In most of the variant forms examined the pistil was much smaller than in normal flowers and in many specimens more or less twisted and distorted. The smaller pistils were obpyriform in shape, with the lobes or divisions usually strongly rounded on the back and only in a very few specimens sharply angled as in normal flowers. Development of seeds in any abnormal specimens was not observed.

Most of the specimens found were of the kind shown in figures 7, 8 and 9. These flowers were the nearest approach to the usual type. The sepals were broadly ovate and leaf-like. The petals differed only in being narrower, shorter and very pale in color. The stamens differed from normal ones in being separate. The anthers of the outer series were apparently normal while those of the inner series were poorly developed or entirely lacking. The smallest flower measured only 3 mm. in diameter with a pistil less than 1 mm. in height. Most of the smaller flowers (fig. 9) measured 5–6 mm. in diameter with pistils 1.5–2 mm. in height. The larger forms measured 7–8 mm. in diameter with pistil about 4 mm. high. A few specimens had sharply angled pistils (fig. 7), thus resembling most nearly the form of the pistil in normal flowers. The pistil of the specimen shown in figure 9 was obpyriform and sharply angled, in these respects being intermediate between the specimens shown in figures 7 and 8, but smaller than either of them.

Two flowers (figs. 10 and 11) had enlarged, obpyriform or balloon-shaped pistils, the carpels being partly separate at the apex so that the interior of the ovary could be observed. No ovules were present in these specimens. The sepals and stamens of these flowers were as above described. The petals were rather longer than in most specimens and narrowly obtusate.

A more extreme variation in the pistil form was observed in several flowers (figs. 12, 13 and 15). In these the carpels appeared as separate parts, outspread so as to resemble the petals of a flower. This condition might be produced from a form such as is shown in figures 10 and 11 by having the carpellary leaves become separated to the base and changed from a vertical to a horizontal position. Inside the carpellary leaves are small leaf-like structures which apparently replace the ovules of a normal ovary.

The specimens shown in figures 14 and 16 were the most interesting

of the series. The sepals were broadly obcordate as described in the other forms. The petals were narrowly oblong. Some of the stamens had been transformed into narrowly linear petaloid structures while others were anther-bearing and apparently normal. The pistil did not appear as in other forms described but in its place was found a proliferation of the floral axis producing at the base five oboval, emarginate leaves with very short petioles and culminating at the apex in three leaves of three leaflets each. The leaflets are shown still folded together in the illustration. The condition most closely approaching this was found in the specimens shown in figures 12, 13, and 15, where the carpels have been transformed into leaves, retaining more or less of a cup shape, but without any evident elongation of the floral axis such as had occurred in the specimens last described.

Masters (1869) and Penzig (1890) cite instances of phyllomorphy of floral parts and median proliferation in many kinds of flowers. Phyllody of the carpels and ovules is known to occur in many plants. Masters ('69: 259) refers to the occurrence of petalody of the stamens in *Oxalis* but apparently no case of the peculiar modifications of the flowers of *Oxalis stricta* as described in this article has ever before been reported. No explanation is offered for the abnormalities described.

LITERATURE CITED IN THIS ARTICLE.

- BARTLETT, H. H. Note on *Oxalis stricta* var. *viridiflora*. RHODORA 11: 118. 1909.
HUS, HENRI. Virescence of *Oxalis stricta*. Rep. Mo. Bot. Gard., 18: 99. 1907.
MASTERS, M. T. Vegetable Teratology. 1869.
PENZIG, O. Pflanzen-Teratologie. 2 vols. 1890.

EXPLANATION OF PLATE 122.

Fig. 1. A sepal of a normal flower, $\times 33$. Fig. 2. A sepal of an abnormal flower, $\times 33$. Fig. 3. One leaflet of a foliage leaf, $\times 7$. Fig. 4. A petal of a normal flower, $\times 33$. Fig. 5. A petal of an abnormal flower of the type shown in fig. 15, $\times 36$. Fig. 6. The usual form of the petals of abnormal flowers, $\times 33$. Figs. 7 and 8. Abnormal forms of most frequent occurrence, $\times 33$. Fig. 9. A small abnormal flower without stamens or petals, $\times 33$. Figs. 10 and 11. Abnormal flowers with inflated and partly opened pistils, $\times 33$. Figs. 12, 13, and 15. Forms with the carpellary leaves separate and outspread, the ovules replaced by small leaf-like structures, $\times 33$. Figs. 14 and 16. Forms showing phyllomorphy of the carpels and median proliferation, $\times 33$.

UNIVERSITY OF MINNESOTA.

THE SPECIFIC CHARACTERS OF *HEPATICA AMERICANA*.

M. L. FERNALD.

It has long been known that the common American plant which has passed as *Hepatica triloba* Gilib. (1781) or more properly as *H. nobilis* Schreb. (1771) differs in some respects from the typical European plant, and in 1814 Pursh treated it as *H. triloba a obtusa* with the lobes of the leaves rounded and flowers "generally smaller than in the European plant."¹ In 1817 DeCandolle separated it as *H. triloba* β . *americana*² on account of its much more pilose petioles and scapes, smaller flowers, and the more rounded lobes of the leaves. Somewhat later Ker took it up as *H. americana*, saying "We have no hesitation in recording the american plant as a distinct species from the european *triloba*, to which it has been generally appended for a variety. The lobes of the leaves are rounder and less pointed in the american plant, the flower-stem and leaf-stalks shaggily furred, the whole altogether smaller and of different appearance."³ Subsequent authors for the most part have not recognized the distinctness of the American and European plants, although the essentially continental distribution of the European species and the essentially Alleghanian range of the American indicate that the identity of the two should at least be questioned; since very few, if any, plants are strictly identical in these two very dissimilar areas. Examination of abundant fruiting material of the American plant shows it to possess an achene quite unlike that of the European species. In *H. nobilis* of Europe the plump, conic-ovoid achene tapers to a short thick beak which is terminated by the sessile stigma. In the American plant, on the other hand, the much more slender fusiform or lance-subulate achene is terminated by a very slender and definite, often curved, style. Possessing this definite fruit-character along with its usually much smaller flowers and its rounder-lobed leaves, the Alleghanian plant seems to be an endemic American species which should be called *Hepatica americana* (DC.) Ker.

Whether the plant of eastern Asia is identical with the eastern American or the European species the writer is unable to determine since he has had access to no Asiatic material.

¹ Pursh. Fl. Am. Sept. ii. 391 (1814).² DC. Syst. i. 216 (1817).³ Ker in Edwards, Bot. Reg. v. t. 387 (1819).

Hepatica nobilis in its foliage-character stands somewhat intermediate between the two American species, *H. americana* and *H. acutiloba* DC., and in its achenes more strongly suggests the latter species. The leaves of *H. nobilis*, however, are much more obtusely lobed and have less pronounced sinuses between the lobes. Its involucre bracts are more obtuse and its sepals ordinarily broader, so that *H. acutiloba* may appropriately be still maintained as an American species.

Typical *Hepatica americana* has the flowers blue-lavender, but two other conspicuous color-forms are found, one with white sepals and the other with rose-pink. These for convenience may be designated

HEPATICA AMERICANA, forma **candida**, sepalis albis — Frequent throughout the range. TYPE: rocky woods, Townshend, Vermont, April 16, 1912, L. A. Wheeler, in herb. New England Botanical Club.

HEPATICA AMERICANA, forma **rhodantha**, sepalis roseis — TYPE collected by Mrs. Florence van Fleet Lyman, communicated by C. G. Whiting from plants transferred to his garden at Springfield, Massachusetts (specimen in Gray Herb.).

GRAY HERBARIUM.

POLYMNIA UVEDALIA AND ITS VARIETIES.

S. F. BLAKE.

WHILE studying recently the variations in pubescence of a Mexican *Polymnia*, I had occasion to examine the abundant material in the Gray Herbarium of the common *P. Uvedalia* to determine whether similar differences were to be found in that species which might throw light on the classificatory value of the variations already noted in the Mexican plant. Somewhat to my surprise, the specimens of *Polymnia Uvedalia* fell readily into three rather distinct varieties of decided geographic trend. The common eastern plant, growing (so far as the material at hand indicates) from New York southward to Georgia, thence north and west to southern Illinois, is always very strongly glandular on the pedicels and branches of the inflorescence with both sessile and stalked glands, and the hispid-pilose hairs common to the other two forms are rare or wanting. A variation represented by

four collections from Florida has much fewer and less conspicuous glands, and intermixed with them a considerable number of hispid-pilose hairs. Plants collected by T. F. Allen, G. H. Shull, and A. B. Seymour at various localities within the range of the typical plant somewhat approach the Floridan form in the presence of hispid-pilose hairs, but are best referred to the typical form on account of the very numerous glands.

West of the Mississippi, from Louisiana to Oklahoma and Texas, occurs a very marked extreme in which the pedicels and to a less degree the branches of the inflorescence are so densely and canescently hispid-pilose that the glands are practically concealed from view. It is interesting to note that one of the specimens of this form, collected by Lindheimer (no. 381), bears this note on the label in Engelmann's hand: "Lindheimer thinks it different from *P. Uvedalia*."

On the Bermuda Islands, where it is certainly introduced and seems to be rapidly naturalizing itself, this form is the only representative of the species. The plant is not noticed in Reade's list of Bermuda plants (1883), and as it is very unlikely that so conspicuous a plant could have escaped his notice, it seems very probable that it is a recent introduction.

The three variations of *Polymnia Uvedalia* may be named and characterized as follows.

* Pedicels and branches of inflorescence densely glandular; hispid-pilose hairs few or none.

POLYMNIA UVEDALIA L. var. genuina. Pedicelli et rami inflorescentiae dense glandulosi, glandulis et sessilibus et stipitatis, pilis hispido-pilosis paucis vel nullis.—*Polymnia Uvedalia* L. Sp. II. ed. ii. 1303 (1763). *Osteospermum Uvedalia* L. Sp. I. ed. ii. 923 (1753). *Polymniastrum Uvedalia* (L.) Small in Small & Carter, Fl. Lanc. Co. 302 (1913).—NEW YORK: western part (Gray?). NEW JERSEY: Weehawken, 1864, T. F. Allen. PENNSYLVANIA: Easton, 1869, T. C. Porter. DELAWARE: Wilmington, 1842, E. Tatnell. VIRGINIA: Smith Co., 1892, J. K. Small; Four Mile Run, 1902, G. H. Shull 225. NORTH CAROLINA: Caldwell Co., 1891, Small & Heller; Biltmore, 1897, Biltmore Herbarium 788a. SOUTH CAROLINA: Caesar's Head, 1881, John Donnell Smith. GEORGIA: Early Co., 1901, R. M. Harper 1225. TENNESSEE: Knoxville, 1894, A. Ruth 52; Chilhowee Mts., A. H. Curtiss 1380. KENTUCKY: Harlan Co., 1893, T. H. Kearney, Jr. 251. INDIANA: Orange Co., 1915, C. C. Deam 17347. ILLINOIS: Anna, 1880, A. B. Seymour.

** Pedicels and branches of inflorescence with numerous hispid-pilose hairs more or less concealing the mostly sessile glands.

Var. **floridana**. Pedicelli et rami inflorescentiae sparse glandulosi, glandulis saepissime sessilibus, pilis hispido-pilosis subnumerosis.—FLORIDA: thicket, Brevard Co., Indian River region, 2 Dec. 1902, *A. Fredholm* 5626 (TYPE in Gray Herbarium); Tallahassee, Leon Co., 1895, *G. V. Nash* 2327; Apalachicola, 1897, *Biltmore Herbarium* 788c; without definite locality, *Chapman*.

Var. **densipilis**. Pedicelli et rami inflorescentiae dense canescentesque hispido-pilosi pilis patentibus vel adscendentibus, glandulis inconspicuis.—LOUISIANA: *Hale*. OKLAHOMA: Grand River, Cherokee Nation (Ind. Terr.), 1895, *J. W. Blankinship*. TEXAS: ten feet high, rare on the shady banks of the Guadalupe near New Braunfels, Aug. 1850, *Lindheimer* 381 (TYPE in Gray Herbarium), also 954; Upper Guadalupe River, Aug. 1847, *Lindheimer*. BER-MUDA: shaded bank near Tuckers Town, 1905, *Brown & Britton* 321, also 1908, *S. Brown* 470; near Bailey's Bay, 1908, *S. Brown* 494; along roads, Botanic Garden, Paget, 1905, *J. W. Harshberger*; low shaded place, Paget, 1912, *B. L. Robinson* 50.

STOUGHTON, MASSACHUSETTS.

NOTES ON RARE NEW YORK STATE PLANTS.

F. P. METCALF AND L. GRISCOM.

(Continued from page 37.)

JUNCUS CANADENSIS J. Gay., var. *SUBCAUDATUS* Engelm. Saratoga Co.: ditches along R. R., South Corinth, *C. H. Peck* (11), 1879, p. 54. "Not reported from New York State" (18). Oswego Co.: Granny's Orchard, Palermo, 1895, *W. W. Rowlee* (9). Cayuga Co.: swale in woods N. E. end of Duck Lake, Conquest, July 12, 1916, *F. P. Metcalf*, *L. Griscom* (10). Erie Co.: reported in (6).

JUNCUS TORREYI Coville. Oneida Co.: Oneida Lake (11), 1913, p. 25. Fulton Co.: Johnstown, *Olsson & Alexander* (11), 1913, p. 25. Nassau Co.: Long Beach (17). Onondaga Co.: frequent (5). Oswego Co.: collection of *C. S. Sheldon* (11), 1914, p. 25. Cayuga Co.: $1\frac{3}{4}$ miles N. W. of Spring Lake, along roadside, Conquest, August 13, 1916, *F. P. Metcalf*, *L. Griscom*, *A. H. Wright* (10). Seneca Co.: Dumont's Road, Seneca Falls, August 1895, *W. W. Rowlee*, *K. M. Wiegand* (9). Western New York (18). Monroe Co.: Charlotte, *L. Holzer* (11), 1897, p. 281; Long Pond, *Dr. Anna H. Searing* (4); sandy shores of Lake Ontario, *Gray* (2). Niagara Co.: Goat Island, near the River (20). Erie Co.: reported in (6).

SMILACINA TRIFOLIA (L.) Desf. Franklin Co.: Axton, 1901, *W. B. Howard* (9). Pickerel Pond, 1899, *W. W. Rowlee*, *K. M. Wiegand*, *G. T. Hastings* (9). Herkimer Co.: Frankfort Hill, North Woods Marshes (2). Oneida Co.: Paris Hill, near Oriskany, Summit Lake, Mud Lake, Jordanville Marshes, South Trenton, Swamp of Rome, Point of Rock Lake (2). Madison Co.: Peterboro, Peeksport, Arbor Vitae swamps, *H. D. House* (11), 1914, p. 42. Dutchess Co.: Pine Plains (17). Orange Co.: *Austin* (8), iv. 17. Chenango Co.: Oxford, *Coville* (3); Brisbin swamp, 1887, *H. L. Stewart* (9). Tompkins Co.: Spruce Swamp, Enfield, 1875, 1884, (9). Onondaga Co.: abundant (5). Oswego Co.: Granny's Orchard, Palermo, Birdall's Bog, Volney, 1894-1895, *W. W. Rowlee* (9). Cayuga Co.: Miller's Bog, bog N. of Miller's Bog, bogs N., N. E., and E. of Duck Lake, Conquest; Feathered Bog and adjoining bogs, Victory, June, July, *A. A. & A. H. Wright*, *F. P. Metcalf*, *L. Griscom*. Wayne Co.: Arbor Vitae swamps and bogs, N. E. corner of Butler, also N. and N. E. of Savannah, June, July, *F. P. Metcalf*, *L. Griscom*, *A. A. & A. H. Wright* (10). Monroe Co.: Adam's Basin (2). Genesee Co.: Bergen Swamp, 1897, *A. H. Wright* (9). Cattaraugus Co.: Machias (6).

HABENARIA BRACTEATA (Willd.) R. Br. Essex Co.: along Keene Road near N. Elba, *C. H. Peck* (11a), 1899, p. 131. Lewis Co.: *F. B. Hough* (22b) 1846. Herkimer Co.: Fairfield, *Gray*, and Frankfort Hill (2); near Newport, 1901, *H. D. House* (8), xxxii. 376. Oneida Co.: Sangerfield (2). Madison Co.: Brookfield, *Gray* (2); Cazenovia, *M. C. Conner* (8), xxxii. 376. Schenectady Co.: along Rolleboom of Rotterdam Hills (2). Dutchess Co.: *A. Winchell* (22c), 1851. Reported, but not definitely known from Long Island; rare in Westchester Co., increasing northwestward (17). Chemung Co.: near Elmira, 1893, *Lucy* (3). Cortland Co.: Truxton and Preble, 1893, *K. M. Wiegand* (21). Onondaga Co.: Otisco, 1896 (5); Baldwinsville, *Beauchamp* (8), xxxii. 376. Cayuga Co.: woods N. of Spring Lake, Conquest, June, August, *A. A. & A. H. Wright*, *F. P. Metcalf*, *L. Griscom* (10). Yates Co.: *Sartwell*, Herb. Hamilton College (2). Monroe Co.: Brighton, *C. M. Booth*; near Coldwater, *G. T. Fish*; Troutburg, *M. S. Baxter*; Big Woods, Forest Lawn, *Mrs. H. G. Pierce*; Pinnacle Hill, *Mrs. V. Dewing* (4). Genesee Co.: Bergen Swamp (4). Erie Co.: reported in (6).

HABENARIA BLEPHARIGLOTTIS (Willd.) Torr. Lewis Co.: Beaver Lake, Watson, *B. D. Gilbert* (8), xxxii. 366. Herkimer Co.: Frankfort Hill near Wetmore's Pond (2). Oneida Co.: South Trenton; borders of rock Lake (2). Madison Co.: Fiddlers Green, Peeksport, near Eaton, *H. D. House* (8), 1913, p. 29. Rensselaer Co.: Cranberry Marsh, Sand Lake, *C. H. Peck* (11b), 1910, p. 71; Van Rensselaer Swamp, 1903, *E. M. Cipperly* (9). Orange Co.: Spruce Pond, 25 miles E. of Southfields, *Millsbaugh* (8), xi. 134. Westchester Co.: Lake Mohegan, *T. W. Martins, Jr.* (8), xvi. 124. Rockland Co.: Tuxedo Park (17). Richmond Co.: Mariner's Harbor, *R. G. Eccles* (8), xviii.

214. Suffolk Co.: Babylon, and along S. shore (8), iv. 98; Barton, Miller (8), vii. 17; Patchogue, *W. T. Davis* (8), xxii. 462. Long Island and Staten Island (17). Tioga Co.: near Owego, *Millspaugh* (3). Chenango Co.: Smithville, *Coville* (3). Cortland Co.: Labrador Swamp, Truxton, 1889, *K. M. Wiegand* (21); 1894, *W. W. Rowlee* (9). Onondaga Co.: Centerville, Cicero Swamp (5); Beaver Lake, *Beauchamp* (8), xxxii. 366; Mud Lake, Baldwinsville, 1897, *W. W. Rowlee* (9). Oswego Co.: Mud Lake, 1878, *F. L. Kilborne* (9); Lily Marsh, 1895, *W. W. Rowlee* (9), and *H. D. House* (11), 1914, p. 50. Cayuga Co.: bogs E. and N. E. of Duck Lake, Conquest, August 12, 1916, and Featherbed Bog, Victory, August 13, 1916, *L. Griscom*, *A. H. Wright*, *F. P. Metcalf* (10). Seneca Co.: W. Junius (9), (10). Monroe Co.: Mendon, *M. S. Baxter* (4). Chautauqua Co.: Hanover (6).

POGONIA VERTICILLATA (Willd.) Nutt. Lewis Co.: *F. B. Hough*, very rare, (22b), 1846. Oneida Co.: Oriskany Swamp, *Dr. Knieskern* (1), and *Vasey* (2); mossy bogs on plains of Rome, along R. R., *J. H. Paine, Jr.* (8), xxxii. 377. Madison Co.: Eaton, 1840, *Dr. Bradley* (1); and *H. D. House* (11), 1913, p. 30; Fiddlers Green, 1905, *H. D. House* (8), xxxii. 377. Schenectady Co.: in the pine plains, *Pearson* (2). Dutchess Co.: *A. Winchell* (22c), 1851. Common S. of moraine on Long Island, Staten Island and up Hudson River Valley to Dutchess Co. (17). Broome Co.: N. W. of Binghamton, *Clute* (3). Tompkins Co.: Caroline Hills, Danby Hills, 1881-1882 (9). Onondaga Co.: Otisco, Cicero swamp, Beaver Lake (5); Kirkville, 1902, *House* (8), xxxii. 377. Oswego Co.: Lily Marsh, 1879, *C. S. Sheldon*, 1891, *W. W. Rowlee* (9), and *H. D. House* (11), 1914, p. 25. Cayuga Co.: bogs N. E., E. and N. of Duck Lake, Conquest, June, July, *A. A. & A. H. Wright*, *L. Griscom*, *F. P. Metcalf*; Featherbed Bog, Victory, August 12, 1916, *F. P. Metcalf*, *L. Griscom* (10).

POGONIA TRIANTHOPHORA (Sw.) BSP. Oneida Co.: Pine Plains of Rome, *Knieskern* (2). Madison Co.: Eaton near Leland's upper pond, *Bradley* (2). Reported from vicinity of New York city but not recently collected (17). Onondaga Co.: Beaver Lake, Tamarack Swamps, Geddes Woods (5); Round Lake, Fayetteville (8), vi. p. 192; Kirkville, *Underwood* (8), xxxii. 377. Cayuga Co.: woods N. of Spring Lake, Conquest, August 12, 1916, *L. Griscom*, *A. H. Wright*, *F. P. Metcalf* (10). Seneca Co.: Sheldrake Point, Cayuga Lake, *Gray* (2). Wayne Co.: woods near Savannah, *C. H. Peck* (11), 1872, p. 88; near Lake shore, North Rose, 1906, *Ruth Weed* (9); Arbor Vitae-tamarack Swamp, N. E. corner Butler, August 13, 1916, *A. H. Wright*, *L. Griscom*, *F. P. Metcalf*. Ontario Co.: Gorham, *Sartwell*, in Herb. Hamilton College (2). Monroe Co.: Parma, *Bradley*, and Brockport, *Lennon* (4); Webster and Adams' Basin, *M. S. Baxter* (4). Orleans Co.: Yates, *Miss F. Beckwith* (4). Erie Co.: West Seneca near Smoke's Creek, *Junius S. Smith* (6).

ARETHUSA BULBOSA L. Lewis Co.: *F. B. Hough* (22b), 1846.

Oneida Co.: Oriskany swamp, *Gray* (2); formerly at Flats of Mohawk below Utica (2); Moss Marsh beyond Fort Bull and Rome (2). Schenectady Co.; Major VanVoosts Fly, *Pearson* (2). Delaware Co.: *M. Platt* (22e), 1841. Dutchess Co.: rare and local (17). Suffolk Co.: near Hook Pond, East Hampton, *E. S. Miller* (8), vi. 157; Wading River, 1877, *E. S. Miller* (9). Increasing and frequent southward particularly in Long Island not recorded from Staten Island (17). Cortland Co.: Homer, *G. W. Bradford* (22d), 1833; Labrador Swamp, Truxton, 1893, *K. M. Wiegand* (21), and *Beauchamp* (8), xxxii. 377. Tompkins Co.: Freeville Swamp, Dryden, 1875, *E. H. Palmer* (9). Onondaga Co.: infrequent, Tamarack Swamp (5); Cicero Swamp, Beaver Lake, *Beauchamp* (8), xxxii. 377; E. of Syracuse, *F. Bell, H. D. House* (8), xxxii. 377. Oswego Co.: collection of *C. S. Sheldon* (11), 1914, p. 25; Mud Lake, 1888, *H. L. Stewart* (9). Cayuga Co.: Featherbed Bog, southern portion Victory, June 11, 1916, *F. P. Metcalf, L. Griscom, A. A. & A. H. Wright* (10). Seneca Co.: Junius, *Sartwell*, in Herb. Hamilton College (2). Genesee Co.: West Bergen Swamp (2). Cattaraugus Co.: Machias (6). Chautauqua Co.: Hanover and Cassadaga Lake (6).

SERAPIAS HELLEBORINE L. Herkimer Co.: Mohawk River Flats, Little Falls, *Mrs. L. Burrell* (11), 1914, p. 41. Madison Co.: Cazenovia, Sept. 2, 1915, *Edith Webster* (10). Tompkins Co.: near Newfield, 1890–1916, *Mrs. James*; ravine N. of Beech Woods, Six Mile Creek, Ithaca, August 19, 1916, *F. P. Metcalf* (10). Onondaga Co.: Geddes Gorge, August 1879 (5); Otisco, *W. W. Munson* (11), 1888, p. 132. Oswego Co.: near Fairhaven, Sterling, 1916, *P. Munz* (10). Cayuga Co.: near Auburn, 1904, *G. W. Boynton* (9); woods near Stark Pond, Conquest, July 2, 1916, *L. H. MacDaniels* (10); Nichols Woods, N. of Duck Lake, Victory, August 12, 1916, *F. P. Metcalf, L. Griscom* (10); Botrychium Woods N. of Spring Lake, Conquest, August 11 and 12, 1916, *L. Griscom, A. H. Wright, F. P. Metcalf*. Wayne Co.: N. E. corner Butler, August 13, 1916, *F. P. Metcalf, L. Griscom, A. H. Wright* (10); abundant in woods S. W. of North Rose, Rose, 1915–1916, *A. H. Weed*; woods in S. E. corner of Rose, October 5, 1916, *A. H. Wright, F. P. Metcalf* (10). Ontario Co.: Canandaigua, *E. J. Durand* (8), xxiii. 354. Monroe Co.: Webster, *M. S. Baxter*; Forest Lawn, *Mrs. H. G. Pierce*; North Rush and Henrietta, *E. H. Clapp*; Oak Orchard Creek, *W. H. Lennon* (4a), 1910; Golah; East shore Irondequoit Bay, *Killip & Woodams*; Rattlesnake Point, *Mrs. White*, (4b), 1916. Seneca Park, Rochester, 1916, *Effie Riley* (10). Orleans Co.: 7 mi. S. E. and 3 mi. S. E. of Medina, *L. H. Wild* (9). Niagara Co.: shaded roadside, Wilson, August 24, 1915, *A. J. Eames* (10). Erie Co.: near Scajauquady's Creek, 1882, *Edna M. Porter* (6a).

LISTERA AUSTRALIS Lindl. St. Lawrence Co.: a single plant in large swamp near Fine, August, *C. H. Peck* (11), 1909, p. 35. Fulton Co.: Canada Lake, 1912, *C. P. Alexander*, and 1913, *A. Olsson* (11), 1913,

p. 26. Onondaga Co.: occasional, Cicero Swamp (5); near Baldwinsville, 1885, *Beauchamp & Underwood* (16). Oswego Co.: Lily March, 1876, *A. Wibbe*, and 1879, *C. S. Sheldon*, later *C. S. Sheldon, W. W. Rowlee* (16), (11), 1909, p. 31; Granny's Orchard, E. Palermo, 1894, *W. W. Rowlee* (9). Cayuga Co.: bog E. of Duck Lake, Conquest, June 11, 1916, *L. Griscom, A. A. & A. H. Wright, F. P. Metcalf*, also July 1, 1916, *K. M. Wiegand, L. H. MacDaniels* (10); rich woods E. side of Featherbed Bog, Victory, June 11, 1916, *L. Griscom, A. A. & A. H. Wright, F. P. Metcalf*, and July 1, 1916, *K. M. Wiegand* (10).

MICROSTYLIS UNIFOLIA (Michx.) BSP. Richmond Co.: Egbertville, *Mrs. N. L. Britton* (8), xvi. 135; Ocean Terrace, *C. A. Timmerman* (8), xviii. 214. Long Island, mostly N. of the moraine, Staten Island and increasing northward (17). Chenango Co.: open woods, Oxford, *Coville* (3). Tioga Co.: North Woods, Oakley Corners, Owego, July 26, 1914, *H. M. Mapes* (10). Tompkins Co.: woods, Malloryville Bog, Dryden, August 30, 1915, *A. J. Eames, A. C. Fraser* (10). Onondaga Co.: Carpenter's Road, *H. D. House* (11), 1913, p. 39. Cayuga Co.: woods, N. W. of Featherbed Bog, Victory, August 12, 1916, *A. H. Wright, F. P. Metcalf, L. Griscom* (10).

SALIX CANDIDA Flüge. Lewis Co.: *F. B. Hough* (22b), 1846. Herkimer Co.: Mud Lake, State Marsh, Hidden Lake, Litchfield (2). Otsego Co.: Summit Lake Borders (2). King Co.: *J. B. Zabriskie* (22a), 1885. Dutchess Co.: *A. Winchell* (22c), 1851. Tompkins Co.: Fleming Meadows, Ithaca, (12), (14), and 1914, *C. C. Thomas* (10). Onondaga Co.: frequent in Cold Bogs (5); shore of Tully Lake, 1898, *G. T. Hastings* (9), and 1913, *K. M. Wiegand* (10); Labrador Swamp, 1893, *K. M. Wiegand* (9). Oswego Co.: Fulton, 1887, *H. L. Stewart* (9); Van Burin's Bog, New Haven, 1895, *W. W. Rowlee* (9); Paradise Swamp, N. Palermo, 1895, *W. W. Rowlee, K. M. Wiegand* (9); Paddy Lake, Scriba, 1897, *W. W. Rowlee* (9). Cayuga Co.: Locke Pond (12); Miller's Bog near Spring Lake, Conquest, June 10, 1916, *F. P. Metcalf, A. A. & A. H. Wright, L. Griscom* (10); boggy woods, N. end of Otter Lake, Cato, July 2, 1916, *L. H. MacDaniels* (10). Wayne Co.: Newark, 1880, 1882, *E. L. Hankenson* (9); Tamarack Swamp, S. W. of Savannah (12); Tamarack Swamp, N. E. corner Butler, July 3, 1916, *K. M. Wiegand, A. J. Eames, F. P. Metcalf* (10). Seneca Co.: Junius, *Sartwell* (12). Monroe Co.: marsh head of Irondequoit Bay, *Dr. C. M. Booth* (4); Riga, *Miss F. Beckwith* (4); Adams' Basin, *M. S. Baxter* (4); Mendon, *G. T. Fish* (4). Livingston Co.: Caledonia, *Clinton* (4). Genesee Co.: West Bergen (2).

PYROLA ASARIFOLIA Michx., var. INCARNATA (Fisch.) Fernald. Lewis Co.: *F. B. Hough* (22b), 1846. Herkimer Co.: Mud Lake, Warren (2). Fulton Co.: Cold Springs, Gloversville, *A. Olsson & C. P. Alexander* (11), 1913, p. 27. Oneida Co.: Oriskany, *Dr. Knieskern* (1); Litchfield Marshes (2). Otsego Co.: abundant in marshes near Summit Lake near source of Otsquago Creek and Susquehanna R. (2). Madison Co.: (11), 1913, p. 27. Onondaga Co.: Jamesville

Swamp, Jamesville Road (5). Oswego Co.: (11), 1913, p. 27. Cayuga Co.: Hemlock-tamarack Woods N. of Miller's Bog, near Spring Lake, Conquest, June 10, 1916, *L. Griscom, A. A. & A. H. Wright, F. P. Metcalf* (10). Wayne Co.: in the Tamarack Swamp, S. E. of Savannah (12); Arbor Vitae-tamarack Swamp, near Turtle Pond, N. of Savannah, June 12, 1916, *L. Griscom, A. A. & A. H. Wright, F. P. Metcalf* (10); Arbor Vitae-tamarack Swamp, S. W. of Westbury, Butler, July 7, 1916, *F. P. Metcalf, A. H. Wright, K. M. Wiegand* (10). Erie Co.: Tonawanda Reservation, 5 mi. E. of Akron, *D. F. Day & G. W. C.* (11), 1866, p. 205.

GERARDIA PAUPERULA Britton. Columbia Co.: Copake Falls (17). Richmond Co.: rare (17). Rare on N. shore Long Island, Staten Island (17). Oswego Co.: Mud Lake, Hannibal, *C. S. Sheldon* (11), 1914, p. 48, and *W. W. Rowlee*, 1894, (9); sand dunes, N. of Selkirk, 1902, *W. W. Rowlee, K. M. Wiegand* (9). Cayuga Co.: springy place, N. of Spring Lake, near roadside, Conquest, August 11 and 12, 1916, *L. Griscom, A. H. Wright, F. P. Metcalf* (10).

VALERIANA ULIGINOSA (T. & G.) Rydb. Herkimer Co.: Warren (12). Dutchess Co.: Pine Plains (12). Onondaga Co.: occasional (5). Wayne Co.: Newark, *E. L. Hankenson* (12), Savannah, 1833, *Sartwell* (12); abundant in bogs and Arbor Vitae Swamp near Turtle Pond, S. of E. Butler, Savannah, June 12, 1916, *A. A. & A. H. Wright, L. Griscom, F. P. Metcalf* (10); Arbor Vitae-tamarack Swamp, N. E. corner Butler, July 2, 1916, *K. M. Wiegand, A. H. Wright, F. P. Metcalf* (10). Seneca Co.: Junius, 1827, herb. of J. J. Thomas (12). Monroe Co.: Mendon Swamp, *G. T. Fish* (4); Powder Mills also Periton and Bughnell's Basin (4a). Genesee Co.: West Bergen Swamp (12).

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CORNELL UNIVERSITY.

ORCHIDS FOUND IN THE REGION OF ASQUAM LAKE.

ALBERT EDGAR LOWENSTEIN.

IN the following list are enumerated the *Orchidaceae* found by the members of Camp Algonquin, Holderness, New Hampshire. The region explored was bounded roughly as follows: on the north by Mt. Israel, on the east by Red Hill, on the south by the town of Ashland, and on the west by Mt. Prospect. This district includes all of Asquam Lake. The Squam Range runs from southwest to northeast through the central part of the region.

During the last five years the boys of the camp have scoured this section thoroughly, and have made up a list of some 750 plants. A list of animals has also been made. Of the orchids here mentioned a practically complete series has been contributed to the herbarium of the New England Botanical Club.

CYPRIPEDIUM L.

C. PARVIFLORUM Salsib. Rare; one record, Squam Mtn.

C. ACAULE Ait. Abundant; the commonest orchid.

HABENARIA Willd.

H. BRACTEATA (Willd.) R. Br. Locally common.

H. HYPERBOREA (L.) R. Br. Locally abundant; only found in one place to my knowledge, but very common there.

H. DILATATA (Pursh) Gray. Rare; Squam Mtn.

H. CLAVELLATA (Michx.) Spreng. Common.

H. HOOKERI Torr. Common near the lake.

H. ORBICULATA (Pursh) Torr. Generally found with the last.

H. LACERA (Michx.) R. Br. Common.

H. PSYCODES (L.) Sw. Common.

H. ANDREWSII White. Rare; only two records, Centre Harbor.

H. FIMBRIATA (Ait.) R. Br. Common.

POGONIA Juss.

P. OPHIOGLOSSOIDES (L.) Ker. Only known to grow in one locality, but rather common there.

P. TRIANTHOPHORA (Sw.) BSP. Probably the commonest orchid next to *Cypripedium acaule*, more than 5000 plants found in 1916.

SPIRANTHES Richard.

S. GRACILIS (Bigel.) Beck. Common.

S. CERNUA (L.) Richard. Common.

S. CERNUA var. OCHROLEUCA (Rydb.) Ames. Rare.

S. ROMANZOFFIANA Cham. Common.

EPIPACTIS [Haller] Boehm.

E. REPENS var. ophioides (Fernald) A. A. Eaton. Common.

E. TESSELATA (Lodd.) A. A. Eaton. Common.

E. PUBESCENS (Willd.) A. A. Eaton. Common.

LISTERA R. Br.

L. CORDATA (L.) R. Br. Local; Squam Mountain (*M. L. Fernald*).

CORALLORHIZA [Haller] R. Br.

C. MACULATA Raf. Common.

C. TRIFIDA Chatelain. Local; Squam Mtn.

MICROSTYLIS (Nutt.) Eaton.

M. UNIFOLIA (Michx.) BSP. Rare; three records.

LIPARIS Richard.

L. LOESELII (L.) Richard. Rare; only one record.

N. B. Arethusa bulbosa L. has been reported from the region, but we have not found it. For the record of *Listera cordata* R. Br. I am indebted to Prof. Fernald.

PROVIDENCE, RHODE ISLAND.

HELIANTHEMUM DUMOSUM ON THE MAINLAND OF
NEW ENGLAND.

M. L. FERNALD.

IN 1913 Mr. E. P. Bicknell described as *Crocanthemum dumosum*¹ a plant of Nantucket, Martha's Vineyard and Long Island which, as indicated by him, is abundantly distinct from *Helianthemum canadense*, with which it has been confused. The plant, which is certainly a good species, blooming earlier than *H. canadense* and much earlier than *H. majus*, is, however, not confined to the islands mentioned; but the collections of the Gray Herbarium and of the New England Botanical Club show it to occur also on Block Island, where Mr. Long and the writer found only this species of the genus; on Nashawina, where Mrs. Northrop collected it in 1903; and quite generally on the barrens of Cape Cod, specimens in the herbarium of the New England Botanical Club showing it to extend from Sandwich to Chatham and Eastham. Prof. J. F. Collins and the writer found it also on the mainland of Rhode Island in South Kingstown in 1914.

In publishing the species Bicknell places it in *Crocanthemum* rather than in *Helianthemum*, the inclusive genus to which these plants have long been referred. In doing so he presumably follows Britton in the second edition of the *Illustrated Flora* where the American plants are placed in *Crocanthemum* of Spach and are said to be "with showy yellow flowers, and with other much smaller apetalous cleistogamous ones," a genus with "Type species: *Crocanthemum carolinianum* (L.) Spach."²

It is somewhat singular, if *Crocanthemum* is a distinct genus on account of its small apetalous cleistogamous flowers, that Spach, in publishing *Crocanthemum* with the type species *C. carolinianum*, should have overlooked this fact and should have distinctly given as the leading character of *Crocanthemum*: "Flores omnes 5-petali"; while the American plants with apetalous cleistogamous flowers he placed in a separate genus, *Heteromeris*.³ There is little question that the type of *Crocanthemum*, *C. carolinianum*, lacks the apetalous

¹ Bicknell, Bull. Torr. Bot. Club, xl. 613 (1913).

² Britton in Britton & Brown Ill. Fl. ed. 2. ii. 539 (1913).

³ Spach, Ann. Sci. Nat. sér. 2. vi. 370 (1836).

cleistogamous flowers which Britton makes characteristic of the genus. At least, the herbarium specimens fail to show them; Spach, in publishing *Crocanthemum*, with *C. carolinianum* as the type, distinctly stated that the flowers were all petaliferous; and Barnhart, in his key to *Helianthemum* in the second edition of Small's *Flora of the Southeastern United States*, separates *H. carolinianum* from the other southeastern species by its having "Flowers all alike and petaliferous."¹ Incidentally, *H. carolinianum* is a plant with stems and calyces hirsute, while the species with apetalous cleistogamous flowers have the pubescence chiefly canescent-tomentulose or pannose. If it is justifiable to separate the plants with apetalous cleistogamous flowers as a genus, it would seem that they should not be forced into *Crocanthemum*, which is characterized by its lack of such flowers, but should be maintained in Spach's extreme sense as *Heteromeris*. The characters used by Spach in distinguishing the genera proposed by him as segregates from *Helianthemum* are chiefly of the "more or less" type and, until they are better checked than has been done by those American botanists who have recently taken up *Crocanthemum* in a sense not intended by the author of the genus, it is wise to leave the plants in *Helianthemum*, where their status is free from question.

It is noteworthy in this connection that even Dr. Britton, under *Crocanthemum* in the *Illustrated Flora*, inserts after *C. majus* a newly recorded species for the region, not as *Crocanthemum* but as *Helianthemum georgianum*, thus indicating that the change to *Crocanthemum* was made at the last moment and apparently without very careful study of the question.

Such characters as the length of the style and its straight rather than curved tendency, upon which stress has been laid by students who have attempted to segregate *Helianthemum* into genera, as, for instance, Grosser² in *Das Pflanzenreich*, where our plants are placed in *Halimium*, quickly fail and it is doubtful if these characters are of greater value than in many other genera, such, for instance, as *Carex*, in which we find long or short, straight or curved styles. For example, Grosser's Fig. 18, I, shows the flower of a *Helianthemum* (a genus with styles said to be usually curved) with the style quite as straight and as short as in his Fig. 9, G and H, illustrating *Halimium rosmarinifolium*, a characteristic North American plant which is certainly

¹ Barnhart in Small, Fl. SE. U. S. ed. 2, 796 (1913).

² W. Grosser in Engler, Das Pflanzenr. IV. pt. 193 (1903).

congeneric with *Helianthemum canadense* and *H. majus*. Other distinctions, in the embryo, etc. have been suggested, but it is extremely doubtful if these have been checked in all our species. At least, the writer, finding himself unable with his present knowledge of the group to maintain *Crocanthemum* for the plants of northeastern America, thinks it better to treat the plants as belonging to a subgenus under *Helianthemum*, a course which has commended itself to many scholarly students in the past. The low early-flowering species of the coastal region of southern New England and New York should then, as a *Helianthemum*, be called

HELIANTHEMUM dumosum (Bicknell), n. comb. *Crocanthemum dumosum* Bicknell, Bull. Torr. Bot. Club, xl. 613 (1913).

GRAY HERBARIUM.

GLANDULARITY ON *VERONICA ANAGALLIS-AQUATICA* L.—The seventh edition of Gray's Manual describes *Veronica Anagallis-aquatica* L. as smooth. However, specimens collected in Sheffield and Stockbridge, Massachusetts, have the stem and branches of the inflorescence thickly clothed with glandular pubescence. Three specimens in the Gray Herbarium from England, Bohemia, and France are smooth, while one from the Azores is glandular. In America the glandular form has been collected at Tinmouth, Vermont; Newark, New York; Lancaster, Pennsylvania; and Berkshire County, Massachusetts. The smooth one, on the other hand, has been found in Ipswich, Massachusetts, in New Jersey, Pennsylvania, Missouri, New Mexico, Arizona, Oregon, and Assiniboia. A specimen from Virginia has the inflorescence glandular and the stem smooth. Further collection and examination of material of this species is needed to determine the constancy, geographic bearing, or taxonomic significance of these differences. In any event it appears that the description in the Manual should read "smooth or glandular." — RALPH HOFFMANN, Kansas City, Missouri.

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